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पोतनिर्माण — समुद्री जहाजों के लिए अतिशबाजी द्वारा विपत्ति संकेत

भाग 1 सामान्य अपेक्षाएँ

Indian Standard

SHIPBUILDING — PYROTECHNIC DISTRESS SIGNALS FOR SHIPS

PART 1 GENERAL REQUIREMENTS

UDC 662·12 : 629·12

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 1995

Price Group 3

Marine Instruments and Safety Aids Sectional Committee, TE 20

FOREWORD

This standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Marine Instruments and Safety Aids Sectional Committee had been approved by the Transport Engineering Division Council.

Pyrotechnic distress signals form parts of the lifeboats and liferafts equipment in accordance with Life Saving Appliances Rules, 1986 under the Merchant Shipping Act, 1958.

The Indian Standards covering the whole range of pyrotechnic distress signals is being published in the following parts:

Part 2 Red flare parachute signal
Part 3 Red star rocket signal
Part 4 White flare signal
Part 5 White flare parachute signal
Part 6 Explosive shell signal
Part 7 Explosive rocket signal
Part 8 Orange smoke signal
Part 9 Red flare signal

While formulating these standards, assistance has been derived from GB 3107.1-3107.9-1982 'Standards of Pyrotechnic Signals for Ships' issued by China State Bureau of Standards. The provisions of IMO Resolution A.521 (13) have also been covered in the standards.

The committee responsible for the preparation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

SHIPBUILDING — PYROTECHNIC DISTRESS SIGNALS FOR SHIPS

PART 1 GENERAL REQUIREMENTS

1 SCOPE

This Indian Standard specifies general requirements for pyrotechnic signals used for ships, life boats and life rafts at the time of distress. Its function conform to the signal equipment standard for the seagoing vessels, SOLAS Convention (1974) and Entertainment regulations for Preventing Collision at sea (1972).

2 TERMINOLOGY

For the purpose of this standard the following definitions shall apply.

2.1 Pyrotechnic Signal

Pyrotechnic signal is the general term for the distinguished or contact signals considering the chemical and physical phenomenon of sound, flame or smoke produced while igniting the chemical mixutre like gun powder.

2.2 Explosive Type

Explosive type is the reaction method in which sound and smoke are given out by igniting chemical mixture.

2.3 Flame Type

Flame type is the reaction method which has the flame burning and light and flame are given out when the chemical mixture is ignited.

2.4 Smoke Type

Smoke type is the reaction method which has no flame but smoke is given out on igniting the chemical mixture.

2.5 Colour Type

Colour type is the reaction method in which colour is emitted on the surface of the water when chemical mixture comes into contact with water.

3 PYROTECHNIC TYPES AND BASIC PARAMETERS

3.1 Types and basic parameters of the pyrotechnic signals for ships shall conform to the stipulations given in Table 1.

3.2 The materials of the sound model pyrotechnic signals shall be of non-metallic which do not injure people.

4 GENERAL REQUIREMENTS

4.1 Ignition Devices

4.1.1 The ignition devices of the pyrotechnic signal products shall be safe and dependable, easy to operate and shall be set off by pulling or by striking. It shall be indelibly marked with clear and precise operating instructions.

4.1.2 A parachute flare and hand flare shall have integral means of ignition.

4.1.3 Ignition devices shall be packed with the signal shell, and conveniently placed in a ready to ignite condition.

4.1.4 Action time of the ignition devices shall not exceed 4 s and shall not be less than 2 s.

4.2 Appearance and Composition of Products

4.2.1 Appearance of the product shall be such that the igniting and the firing end of the pyrotechnic signals shall be able to be distinguished during day and night.

4.2.2 Under the unfavourable conditions and by wet or cold hands not wearing gloves, it shall be possible to fire the pyrotechnic signal and sits applied force shall not be more than 7 kg.

4.2.3 After immersion for 24 hours under water at a depth of 1 m, the performance of the pyrotechnic signal shall not be affected. It shall function effectively after being immersed in the ready to use condition for 5 minutes under 10 cm of water. It shall also function effectively when subjected to a salt spray (20 percent natrium chloride solution) at a temperature of +35°C ± 3°C for at least 100 h.

4.3 The various pyrotechnic signals shall be able to be used normally within a temperature range of –30 to + 65°C.

4.4 The various pyrotechnic signals shall be put to durability vibration tests as per the stipulations of Table 2 and it shall not get ignited or exploded during test.

4.5 The various pyrotechnic signals shall not ignite or explode when dropped freely from a height of 3 m on a steel plate surface.

4.6 The various pyrotechnic signals, in order to satisfy the demands of utility, shall separately conform to the specification requirements of individual products covered in separate Indian Standards.

4.7 Validity period of the various pyrotechnic signals according to the storage conditions stipulated in this standard shall not be less than 3 years starting from its manufacturing date.

Table 1 Types and Basic Parameters of Pyrotechnic Signals

(*Clause* 3.1)

Sl No.	Type	Form	Launching Method	Basic Parameters
(1)	(2)	(3)	(4)	(5)
1.	Explosive rocket	Sound	Rocket	Rocket is fired 300 m into the air, signal chemcial reaction gives out explosive sound, which shall be heard at a distance not less than 5 nautical miles
2.	Explosive shell	Sound	Throw	Throw into the open air on the side of the ship, signal chemical reaction gives out explosion sounds which shall be heard at a distance not less than 2 nautical miles
3.	Red flare parachute signal for ships	Flame	Rocket	The rocket is fired 300 m into the air, parachute hangs red flare which shall last for not less than 40 seconds, flare strength being not less than 30 000 candela and rate of descent not more than 5 m/s
4.	White flare parachute signals for ships	Flame	Rocket	Rocket is fired 300 m into the air, parachute hangs white flare which shall last for not less than 40 seconds, flare strength being not less than 30 000 candela and rate of descent not more than 5 m/s
5.	Red star rocket signal for ships	Flame	Rocket	Rocket is fired 300 m into the air, which gives out red flare for not less than 8 second, flare strength being not less than 80 000 candela
6.	Red flare signal for ships	Flame	Handle	Signal chemical stick continuously gives red flare for not less than 60 seconds, flare strength being not less than 15 000 candela
7.	White flare signal for ships	Flame	Handle	Signal chemical stick continuously gives white flare for not less than 60 seconds, with flare strength being not less than 15 000 candela
8.	Orange smoke signal for ships	Smoke	Float	Floating on the surface of water, signal by chemcial reaction with sea water gives out orange smoke for not less than 3 minutes which shall be seen from a distance of not less than 2 nautical miles
9.	Self activating smoke signal for life buoys	Smoke	Float	Floating on the surface of water, signal by chemcial reaction with sea water gives out orange smoke for not less than 15 minutes which shall be seen from a distance of not less than 2 nautical miles

Table 2 Vibration Tests

(*Clauses* 4.4 and 5.2.2)

Sl No.	Frequency Hz	Amplitude of Vibration	Duration Minutes
1.	10	±1.00	30
2.	20	±0.30	30
3.	30	±0.15	30

5 TESTING

5.1 Visual Test

Visual test shall be carried out according to the stipulations of this standard, as regards the components, test samples and packing. Its external appearance is to be observed, its size is to be checked with the common or special mesuring tool, its quality is to be measured with weighting apparatus and from the burning test, the theoretical and chemcial performance like the flare strength, colour and time are to be measured. Further its marking has to be varified and packing of the finished product and the shipment packing also to be checked.

5.2 Vibration Test

5.2.1 Use test sample firm enough which are to be fixed on the vibration test equipment and while fixing the test samples, its firing direction shall be same as that of the vibration amplitude.

5.2.2 According to the stipulations of Table 2, the vibration is continued for 30 minutes on every frequency point. Its frequency may vary ±1% and amplitude may vary ±15%.

5.2.3 The test samples after the vibration test, shall undergo inspection of the external appearance and connecting items and also the release test is to be carried out.

5.3 Dropping Test

5.3.1 Each test sample is freely dropped on a steel plate (approximately 6 mm thick cemented to a concrete floor) surface once from a height of 2 m, with its firing end vertically directed towards the steel plate. It shall remain in safe condition after this test and shall subsequently be operated and function effectively.

5.4 Low Temperature Test

5.4.1 Within the test space allow the temperature to be maintained at the marked range of –30°C for at least 48 h. Its temperature fluctuation speed in every 5 min shall be at an average of 0.7 to 1.0°C/min.

5.4.2 Place the test samples inside the low temperature test space, after transferring to the constant temperature mark of –30°C. After 8 min, check up its external appearance and connecting items and immediately carry out the release test.

5.5 High Temperature Test

5.5.1 The test space shall conform to the stipulations of **5.4.1**, but its marked value shall be within the range of 2.0°C/min.

5.5.2 Put the test samples inside the high temperature test space after transferring to the marked constant temperature of +65°C for at least 48 h. After 8 min check up the external appearance and connecting items and also immediately carry out the release test.

5.5.3 Subject the sample to a temperature of +65°C and 90% relative humidity for at least 96 h, followed by 10 days at 20 to 25°C and 65% relative humidity. The sample shall function effectively.

5.6 Water Proof Test

5.6.1 The depth of the test water trough shall not be less than 130 cm and water temperature shall be 20 ± 5°C.

5.6.2 Immerse the test samples in the water trough, its water depth not being less than 100 cm. Take out the test sample after 24 h. Check the external appearance and immediately carry out the release test.

5.7 Release Test

5.7.1 Release test of the various pyrotechnic signals shall be carried out at the proper test field as per the operation manual of the product.

5.7.2 Releasing test shall measure the utility performance parameter stipulated by the product standard.

5.8 General Performance Test

5.8.1 The various pyrotechnic signals, at the time of the design or whenever necessary, shall not only undergo the individual item performance test, as per **5.2** to **5.7**, but also undergo the general performance test and the same test samples shall also undergo release test after undergoing the water-proof endurance, low temperature and high temperature tests.

5.8.2 *Low and High Temperature Test Cycle*

After undergoing the low temperature test, as per **5.4**, the test sample shall be placed in blowing wind of 20 ± 5°C for 4 h to enable it to come back to the room temperature. Then subject the test sample to the high temperature test as per **5.5**. After the high temperature test, the test samples shall be placed in blowing wind of 20 ± 5°C for 4 h to enable it to come back to the room temperature.

5.8.3 The water-proof and vibration test of the samples shall separately be carried as per **5.2** and **5.6**.

5.8.4 The test samples shall undergo the external appearance and connecting items checks separately, before and after each test, and the release test shall be carried out after the general performance test to examine its utility performance.

5.8.5 A rocket parachute flare rocket shall function efficiently when tested by firing at an angle of 45° to the horizontal.

5.8.6 When a rocket flare parachute is operated from a hand held position it shall be demonstrated that the recoil of rocket is minimal.

5.9 A hand flare shall be activated and shall burn for a period of not less than one minute. After burning for 30 s it shall be immersed under 100 mm of water for a period of 10 s and shall continue burning for at least further 20 s.

5.10 A hand flare shall be activated 1.2 m above a test pan 1 m^2 containing two litres of heptane floating on a layer of water. The test shall be conducted at an ambient temperature of +20°C to 25°C. The flare shall be allowed to burn completely and the heptane shall not be ignited by the flare or material from the flare.

5.11 A buoyant smoke signal shall be subjected to tests as under.

5.11.1 Following temperature cycling one smoke signal shall be activated and then shall operate in seawater at a temperature of – 1°C. A second smoke signal shall be activated and then shall operate in seawater at a temperature of 30°C. After the smoke signals have been emitting smoke for 1 m they shall be fully submerged for a period of not less than 10 s and shall continue emitting smoke during and after submersion and demonstrate a total period of smoke emission of not less than 3 min.

5.11.2 A smoke singal shall function in water covered by a 2 mm layer of heptane without igniting the heptane.

5.11.3 Laboratory testing of a smoke signal shall establish that at least 30 percent obscuration throughout the minimum emission time is attained when the smoke is drawn through a 19 cm diameter duct by a fan capable of producing an entrance air flow of 18.4 m^3/min. The colour of the smoke shall be orange as per the diagram of the International Illumination Committee.

5.11.4 A smoke signal shall be tested in waves at least 300 mm high. The signal shall function properly for not less than 3 min.

6 INSPECTION

6.1 Manufacturing inspection of every pyrotechnic signals is done batchwise after obtaining appearance certificate from the statutory authorities. Every batch of 480 pieces is separately examined according to this standard and the individual product standard.

6.2 The vibration at various pyrotechnic signals is divided into delivery inspection and routine inspection.

6.3 Delivery Inspection of the Products

6.3.1 The test samples for the delivery inspection shall be selected from each batch of products. On delivery inspection, if the quality and size of any item is not according to the stipulations of this standard, double the quantity of these items are inspected and if they are still not in conformity with the stipulations, the whole lot is sent back for alterations. If the performance of any item is not in conformity with its stipulation, then again the whole lot is sent back for alterations.

6.3.2 The altered products may be sent again for delivery inspection; for the recheck two sets of samples shall be taken and the inspection is to be carried out as per the delivery inspection stipulation. If still, they are found to be not conforming to the stipulations, then that batch is rejected.

6.4 Check of the Validity Period

6.4.1 Of the products produced after obtaining the test certificate, three test samples after the delivery inspection, shall be stored as per the standard storage conditions and within the validity period of 3 years, the release test is to be carried out.

6.4.2 The validity period is determined by the release test results of the samples and by the specification requirement of the product, then the products may be exempted from the validity period inspection. If the composition technology or the materials of the products are changed, or when the production is reviewed after stopping it for an year, then the products are to be tested again for its validity period.

7 MARKING

7.1 On the outer surface of every shell of various pyrotechnic signal there shall have the following markings:

a) Signal type;
b) Number of this Indian Standard;
c) Use and basic parameters;
d) Source of manufacture and trade mark; and
e) Manufacturing year, month, batch number and validity date.

7.2 On every packing container of the finished product, there shall be the following stipulated markings:

a) Signal type;
b) Number of this Indian Standard;
c) Quantity of signals inside the container;
d) Source of manufacture and trade mark; and
e) Manufacturing year, month, batch number and validity date.

7.3 On every transhipment packing container there shall be the following stipulated markings:

a) Singal type, quantity and total weight;
b) The outer length x width x height of the containers;
c) Source of manufacture and trade mark; and
d) Words like 'INFLAMMABLE', 'EXPLOSIVES', 'KEEP DRY', 'AVOID SHAKE', 'FRAGILE', 'HANDLE WITH CARE' and schematic diagram.

7.4 Markings shall be clear and indelible and schematic diagram shall be simple and expressive.

8 PACKING

8.1 Packing of the finished pyrotechnic signals shall conform to the following stipulations:

a) Each pyrotechnic signal shall have air tight transparent polythene packings.
b) Packing container of the finished product shall be water proof, hard plastic or metal.
c) Products of same type or batch number shall have one packing container.
d) Also the type and quantity of the signals according to the ships, life boats and life rafts may be packed into one packing container.
e) Inside the packing container of the finished products there shall be cushioning material between each product.

8.2 Transhipment packing of the pyrotechnic signals shall conform to the following stipulations:

a) The design of the transhipment packing container shall conform to the transportation, security, safety and dependability requirements.
b) Inside the transhipment packing container, there shall be same variety of products and any

multiple of six such as 60, 72 or 120.

c) If the packing container of the finished product is of metallic material, transhipment packing container may be of non- metallic materials and vice-versa.

9 STORAGE

9.1 The goods packed as per the stipulations in 7, before, placing in the ship, lifeboat or liferaft shall be properly stored in the warehouse in an atmospheric temperature of –10 to +40°C, and a relative humidity of not more than 80 percent.

9.2 The products packed as per the stipulation of **7.1** and **7.2**, shall be properly placed in the ship, lifeboat or raft in a place with proper heat and moist prevention; its atmospheric temperature being –30 to +65°C.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Marine Instruments and Safety Aids Sectional Committee, TE 20

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(*Continued on page* 6)

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Composition of Life Saving Equipment and Accessories Subcommittee, TE 20 : 2

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